REMARKS

Reconsiderations of this application, in view of the following remarks, is respectfully requested.

I Status Of The Claims

Claims 1-28 are pending in this application.

Claim 1 has been amended to clarify that the adsorbent is derived form sewage sludge. Support for this amendment may be found, for example, in the specification at page 7, lines 18-22. No new matter has been added by this amendment.

Claims 11-28 have been withdrawn from consideration by the Examiner. Accordingly, claims 1-10 are currently at issue.

II Rejections Under 35 U.S.C. § 112

Claims 1-10 stand rejected under 35 U.S.C. § 112, first paragraph, for lack of written description. The Examiner contends that the specification does not describe the subject matter of these claims in such a way as to convey that the inventors had possession of the claimed invention at the time the application was filed. Specifically, the Examiner contends that there is insufficient disclosure of a two component composition, in particular the nitrogen bearing porous carbon components, save for the description of the Calgon Corp materials. This rejection is respectfully traversed.

As the Examiner correctly notes at page 2 of the Office Action, the adsorbent of the present claims is derived from sewage sludge. The absorbent contains porous carbon containing organic nitrogen species and inorganic matter, both of which are derived from the sewage sludge; the claimed adsorbent is not prepared by mixing porous carbon and inorganic matter components obtained from separate sources. Contrary to the Examiner's assertion, the specification adequately describes an adsorbent that comprises a porous carbon with incorporated organic nitrogen species,

and inorganic matter derived from sewage sludge, and adequately describes how to make and use such an adsorbent.

Specifically, the Examiner's attention is drawn to the adsorbent materials derived by pyrolysis of Terrene®, as disclosed in the Examples, Sections 6A, 6B, and 6G, at pages 13-15, and 42 of the specification, and the analytical data set forth in Tables 2-4 at pages 15, 21, and 22 of the specification.

Thus, the specification provides a sufficiently detailed disclosure of the physical and functional characteristics of the claimed adsorbent so as to convey to a person skilled in the art that the applicants were in possession of the invention at the time the present application was filed.

Accordingly, reconsideration and withdrawal of this rejection is respectfully requested.

The Examiner contends that the term "highly dispersed" in claim 2 is subjective, and that perhaps the term "uniformly" is meant.

Applicants respectfully submit that the term "highly dispersed" in claim 2 means that the catalytic oxides are dispersed in the adsorbent in a large number of small particles. As used in claim 2, the term "highly" does not mean "uniformly", since, as the Examiner will appreciate, a material may be "uniformly" dispersed, but present only as a small number of large particles.

III Rejections Under 35 U.S.C. § 103(a)

Claims 1-10 stand rejected under 35 U.S.C. §103(a) as obvious over Kahalili *et al.* (U.S. Patent No. 6,030,922, "Kahalili"), in view of Matviya *et al.* (U.S. Patent No. 5,356,849, "Matviya"). The Examiner contends that Kahalili teaches treating sludge to make an inorganic NO_x, SO_x and VOC scrubber. The Examiner concedes that Kahalili does not teach the nitrogen containing material, but asserts that Matviya teaches this material as a SO_x, NO_x and organic scrubber. The Examiner concludes that it would have been obvious to use these two agents together, in order to gain their cumulative effect for gas scrubbing. With respect to claims 8-10, the Examiner asserts

that as a result of optimization of the amounts in mixtures within the claimed scope would have the claimed pH values. This rejection is respectfully traversed.

Kahalili is directed to a method for synthesizing carbon in activated form, by pyrolysis of sludge that has been subjected to chemical activation, light, and humidity treatment. Kahalili states that the dried sludge material undergoes chemical activation using a metal based chemical activating agent such as zinc chloride and potassium hydroxide (see Kahalili at col. 3, lines 46-55). Moreover, the activated carbon of Kahalili undergoes subsequent light and humidity treatment stages, wherein the chemically activated carbon is exposed to light having an average intensity of 50 microwatts in an environment having a relative humidity of about 60 to about 70 percent, in order to promote oxidation of the metal within the chemically-activated material (see Kahalili at col. 2, lines 46-52). As can be seen in Examples 6 and 7 of Kahalili, the light and humidity treatment stages are critical to the Kahalili process (see table 4 at column 8) in order to produce a product having the desired surface area (see Kahalili at col. 8, lines 24-34).

Matviya is directed to the preparation of a carbonaceous char by thermal oxidation of bituminous coal followed by addition of a nitrogen containing compound (such as urea) and subsequent pyrolysis.

Matviya is completely silent with respect to an adsorbent prepared from sewage sludge. Accordingly, one of ordinary skill in the art would have no motivation to combine the teachings of Matviya with the teachings of Kahalili.

As stated above, the adsorbent of the present invention is prepared by thermal drying of dewatered sewage sludge to form granulated organic fertilizer, followed by pyrolyzing the resulting organic fertilizer. The adsorbent of the present claims is not prepared by mixing two or more different components, and is not prepared by a process that utilizes any chemical activation, light or humidity treatment stages. One of ordinary skill in the art would have no reasonable expectation of success that an adsorbent could be prepared without using the chemical activation, light, and

humidity treatment stages disclosed in Kahalili, or that such an adsorbent could be prepared from a single source, without adding a separate nitrogen component, as taught by Matviya.

As set forth at page 7 of the specification, adsorbents derived from activated carbons have several disadvantages, including limited capacity for physical adsorption of volatile organic compounds due to the presence of caustic materials in the carbon pore system, low self ignition temperatures, and the need for special precautions when dealing with caustic materials.

As can be seen from Table 7 on page 31 of the specification, the H_2S adsorbent capacity of the sewage sludge-derived adsorbent of the present invention pyrolyzed at 950°C (Sample SC-4) is twice that of as-received coconut-shell based activated carbon (Sample S-208).

Based on the teachings of Kahalili and Matviya, either taken alone or in combination, one of ordinary skill in the art would have no reasonable expectation of success that an adsorbent derived from sewage sludge (i.e., an adsorbent that is not an activated carbon) containing 20-30% porous carbon with incorporated organic nitrogen species would be highly effective for the adsorption of acidic gases. Accordingly, the present claims are not obvious over the combination of Kahalili and Matviya. Applicants respectfully request that the rejection be withdrawn.

IV Rejections Under 35 U.S.C. § 102(b) and 103(a)

Claims 1-10 have also been rejected under 35 U.S.C. §102(b) as anticipated by, or in the alternative, under 35 U.S.C. §103(a) as obvious over Lewis (U.S. Patent No. 4,122,036, "Lewis") or Kahalili. The Examiner contends that both these references disclose pyrolyzing sludge, and that there is no difference between the resulting compositions and the disclosure of page 42 of the specification. This rejection is respectfully traversed.

As conceded by the Examiner at page 2 of the Office Action, Kahalili does not disclose an adsorbent that includes a nitrogen containing carbon material, as required by the present claims. Moreover, Kahalili does not disclose the required percentage limitations of claim 1 (namely 20-30% percent carbon containing organic nitrogen species and 70-80% inorganic matter). As stated above,

Kahalili is directed to a method for synthesizing carbon in activated form, by pyrolysis of sludge that has subjected to chemical activation, light, and humidity treatment. The process described at page 42 of the present specification does not include any of these treatment stages, and the adsorbent of the present claims is prepared solely from dewatered sewage sludge, not from activated carbon that has undergone chemical activation, light, and humidity treatment steps.

Moreover, Kahalili teaches away from the present invention. At col. 3, lines 1-6, Kahalili discloses that the sludge material used therein has "a high organic content", being at least one third, and preferably about 35 to about 75 weight percent organic materials. The adsorbent of the present invention has 20-30% porous carbon.

Kahalili does not teach or suggest an adsorbent derived from sewage sludge that contains 20-30% porous carbon containing organic nitrogen species, and 70-80% inorganic matter. Accordingly, the present claims are not anticipated by or obvious over Kahalili.

Lewis teaches a process for pyrolyzing sewage sludge to produce activated carbon, whereby recycled hot char produced during the process is added to the sewage sludge starting material (see col. 1, lines 45-46). Lewis is completely silent respecting the weight percent of porous carbon and inorganic matter present in the adsorbent, as well as the presence of organic nitrogen species, as required by claim 1. Lewis is also silent respecting the presence of catalytic oxides and the surface area and pH of the adsorbent.

Indeed, Lewis teaches that the quantity of char that must be recycled (which will determine the final carbon content of the activated carbon) depends on the initial sludge conditions, and operating conditions of the apparatus used (see col. 1, lines 49-52). Accordingly, the activated carbon produced by Lewis will not necessarily have 20-30% porous carbon with incorporated nitrogen species, as required by the present claims. Accordingly, the present claims are not anticipated by Lewis.

Moreover, based on the teachings of Lewis, one of ordinary skill in the art would have no reasonable expectation of success that an adsorbent containing 20-30% porous carbon containing organic nitrogen species could be prepared by pyrolysis of sewage sludge without the step of recycling hot char utilized in the Lewis method. Accordingly, the present claims are not obvious over Lewis. Moreover, one of ordinary skill in the art would have no reasonable expectation of success, based on the teaching so Lewis and Kahalili that an adsorbent derived from sewage sludge (i.e., an adsorbent that is not an activated carbon) containing 20-30% porous carbon with incorporated organic nitrogen species would be highly effective for the adsorption of acidic gases.

Applicants submit that the present claims are not anticipated by or obvious over Lewis or Kahalili, either taken alone or in combination, and respectfully request that the rejection be withdrawn.

In view of the above, each of the presently pending claims in this application is believed to be in condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

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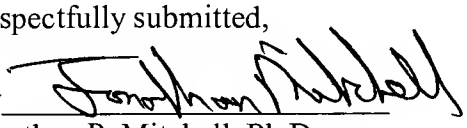
Respectfully submitted,

By 

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